Patent Claims

1. A method of generating a 3-dimensional effect comprising:

providing at least one first image layer of a chiral liquid crystal material, and at least one second image layer of a chiral liquid crystal material, wherein one of said first and second image layers reflects right-handed circularly polarised light and the other reflects left-handed circularly polarised light,

wherein said first and second image layers each comprise polymerised or crosslinked cholesteric liquid crystal material and are obtained by providing a polymerisable chiral liquid crystal material on a substrate, aligning said material into planar orientation and polymerising said material in its liquid crystal state at a temperature below 60°C, and/or

said first and second image layers are not directly superimposed onto each other and/or do not form a stereo pair of images.

2. A method according to claim 1, wherein said first and second image layers each comprise polymerised or crosslinked cholesteric liquid crystal material and are obtained by providing a polymerisable chiral liquid crystal material on a substrate, aligning said material into planar orientation and polymerising said material in its liquid crystal state at a temperature below 60°C.

3. A method according to claim 2, wherein the polymerisable chiral liquid crystal material comprises at least one achiral polymerisable mesogenic compound and at least one chiral compound which, optionally, is polymerisable, mesogenic, or both.

4. A method according to claim 2, wherein said first and second image layers are obtainable by coating or printing a layer of polymerisable chiral liquid crystal material onto the same side or onto opposite sides of a substrate, orienting the material, polymerising the material and optionally removing the substrate from the polymerised layers.

5. A method according to claim 3, wherein said first and second image layers are obtainable by coating or printing a layer of polymerisable chiral liquid crystal material onto the same side or onto opposite sides of a substrate, orienting the material, polymerising the material and optionally removing the substrate from the polymerised layers.

6. A method according to claim 1, wherein said first and second image layers comprise encapsulated cholesteric liquid crystal material.

7. A method according to claim 1, wherein said first and second image layers comprise polymerised cholesteric liquid crystal material.

8. A method according to at least one of claims 1 to 7, wherein said first and second image layers reflect circularly polarised light of different wavelengths.

9. A method according to at least one of claims 1 to 8, wherein said first image layer is provided on a substrate and optionally covered by an intermediate layer, and said second image layer is provided on top of said first image layer.

10. A method according to claim 9, wherein said substrate comprises a light absorbing material.

11. An apparatus for generating a 3-dimensional effect comprising at least one first iamge layer and at least one second image layer as defined in at least one of claims 1 to 10.

12. An apparatus according to claim 11, further comprising a means of detecting the 3-dimensional effect comprising a pair of films, foils, lenses or glasses, one of which transmits the right-handed circularly polarized light and the other transmits the left-handed polarized light reflected by said first and second image layers.

13. A 3-dimensional image generated by a method or an apparatus according to at least one of claims 1 to 12.

14. Use of a method, apparatus or image according to at least one of claims 1 to 13 for decorative or security applications.

15. A security or verification marking or device comprising an apparatus or image according to at least one of claims 11 to 13.

16. A security device comprising a printed area containing both enantiomeric forms of a chiral liquid crystal material that can verified from large distances by viewing through a device made from two circular polarisers, one of which is left handed and the other is right handed.

17. A document of value comprising a security or verification marking or device according to claim 15 or 16.